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USDA-APHIS-WILDLIFE SERVICES
BSMARCK, NORTH DAKOTA

5-YEAR ENVIRONMENTAL MONITORING REVIEW
for
"WILDLIFE DAMAGE MANAGEMENT in NORTH DAKOTA for the PROTECTION of LIVESTOCK, PUBLIC HEALTH and SAFETY, PROPERTY, and WILDLIFE"
Fiscal Year 2004 through Fiscal Year 2008

Introduction

The US Department of Agriculture (USDA) - Animal and Plant Health Inspection Service (APHIS) - Wildlife Services (WS) is a cooperatively funded, service-oriented federal program authorized by Congress and directed by law to reduce damage caused by wildlife (Act of March 2, 1931, as amended [46 Stat. 1468; 7 U.S.C. 426-426c], and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, as amended [Public Law 100-202, Stat. 1329-1331] [1]). The alleviation of damage or other problems caused by or related to the behavior of wildlife is termed wildlife damage management and recognized as an integral component of wildlife management (The Wildlife Society 1992). WS generally uses an adaptive Integrated Wildlife Damage Management (IWDM) approach (WS Directive 2.105[2]), where a combination of methods may be used or recommended to reduce wildlife damage. IWDM is the application of safe and practical methods for the prevention and reduction of damage caused by wildlife based on local problem analyses and the informed judgment of trained personnel (Slate et al. 1992). The imminent threat of damage or loss of resources is often sufficient for actions to be initiated and the need for predator damage management (PDM), or the reduction of human/predator conflicts, is derived from the specific threats to resources. However, before any WS action is taken, a request must be received and an "*Agreement for Control*" must be signed by the landowner/administrator or other comparable documents must be in place. When requested, WS cooperates with land and wildlife management agencies to effectively and efficiently reduce human/ wildlife conflicts according to applicable federal, state and local laws, regulations, policies, orders, and procedures, including the Endangered Species Act of 1973 (ESA) as amended (16 USC 1531-1543) (WS Directive 2.210). None of WS' human/predator conflict reduction activities have resulted in habitat modifications.

Background

North Dakota WS completed a "*Wildlife Damage Management in North Dakota for the Protection of Livestock, Public Health and Safety, Property, and Wildlife*" Environmental Assessment (EA) in 1996. The EA analyzed PDM for the protection of livestock, property, and wildlife, and to reduce any predator threat to public health and safety. The Decision/FONSI was signed March 20, 1997 and later supplemented on June 25, 2003. The 2003 supplement determined the analysis conducted in the 1996 EA was still valid [3] and annual monitoring and the supplement Decision and FONSI concluded that a new EA was not warranted. The

[1] WS is directed by Congress to respond to and attempt to reduce damage caused by wildlife, when funding allows.

[2] The WS Policy Manual provides WS personnel guidance in the form of program directives. Information contained in the WS Policy Manual and its associated directives (http://www.aphis.usda.gov/wildlife_damage/WS_directives.shtml) have been used in preparation of this report, but have not been cited in the Literature Cited.

[3] The 2003 supplement addressed the effects of low level flights (during aerial gunning) on non-target wildlife, public land and users, and the environment. Analysis concluded that WS' aerial gunning program is not causing any significant adverse impacts to wildlife, public land and users, or the environment.

supplement concluded that the issues addressed in the original EA would be best addressed by continuing Alterative 3 (Integrated Wildlife Damage Management for Multiple Resources and Land Classes (Proposed Alternative/Action) and articulated that WS continue to coordinate with the North Dakota Department of Game and Fish (NDGF) to monitor the WS take of predators to insure species viability; analysis in the EA focused on six predators: badger, coyote, mink, red fox, raccoon, and striped skunk.

North Dakota WS conducted PDM activities where agreements are in place throughout the state [4] to alleviate and prevent depredation to livestock, agriculture, property, natural resources, and reduce risks to human health and safety. WS conducts activities only at the request of private individuals, state or local governments, resource managers, or other federal agencies. The majority of requests for management are for predatory species whose populations are relatively high or are considered "anthropogenic abundant [5]" (Conover 2002) and after they have caused damage.

Purpose of this Review

The purpose of this review is to: 1) report the results of WS' PDM activities conducted in North Dakota during 2004 to 2008 and evaluate the accuracy of the current analyses, 2) determine if the 2003 Decision/FONSI made in conjunction with this document is still appropriate, and 3) take appropriate action if the affected environment or impacts have significantly changed from the data analyzed in the EA, as amended. This review uses the most currently available information which in most cases is FY04 to FY08 data. Copies of the EA, supplement, Decisions/FONSIs and previous monitoring reports are available from the North Dakota WS State Office, USDA, APHIS, 2110 Miriam Circle, Bismarck, North Dakota 58501-2502.

PROGRAM RESULTS and ANALYSIS - FY04 through FY08

OBJECTIVES

In the 1997 EA, ten objectives were established by WS for the North Dakota PDM program. Those same objectives remained in the 2003 supplement. The objectives and statewide accomplishments toward meeting those objectives from FY04 through in FY08 are detailed below.

***Objective A-1**: Respond to requests for assistance with the appropriate action as determined by North Dakota WS personnel, applying the ADC Decision Model [6].*

During the 5-year reporting period, WS conducted technical assistance or operational projects after receiving a request for assistance from the landowner/manager with predator conflicts. Technical assistance, which included the distribution of information to assist landowners/livestock owners with the reduction or prevention of further damage, totaled 1,327 projects (Table 1). WS conducted operational projects to mitigate/resolve 2,824 occurrences of predator conflicts (Table 2). These conflicts affected livestock owners, human safety, and other resources, and resulted in $760,000 in associated losses. These losses represent only a fraction of the actual losses that likely occurred, and serve more as an indicator of what kinds of predator conflicts occurred rather than an indication of damage magnitude (Connolly 1992).

Table 1. Technical Assistance Projects Conducted FY04 - FY08.

Species	# of Projects	# of Participants
Badger	42	68
Coyote	627	1,408
Mink	9	18
Raccoon	327	450
Red Fox	30	46
Striped Skunk	292	434
Total	1,327	2,424

***Objective A-2:** Hold lamb losses due to predation to less than 3% per year for producers who have signed WS agreements.*

[4] North Dakota WS had active agreements with landowners/managers and conducted activities on 3-5% of the State's total acreage.

[5] Anthropogenic abundant species are those that have benefited from the presence of humans (Conover 2002).

[6] The WS Decision Model is a cognitive process used by WS personnel to determine the best methods to address a given wildlife damage management problem (Figure 3-1) of the EA).

According to the National Agricultural Statistical Service (NASS), the statewide lamb crop ranged from 77,000 head (NASS 2009) to 88,000 head (NASS 2005) during the 5-year reporting period. Documented predation on lambs protected by WS during FY 04 through FY 08 never exceeded 0.9% (Figure 1).

Table 2. Operational Projects Conducted FY04 - FY08.

Species	# of Projects
Coyote	2,087
Red Fox	89
Raccoon	300
Skunk	297
Badger	40
Mink	11
Total	2,824

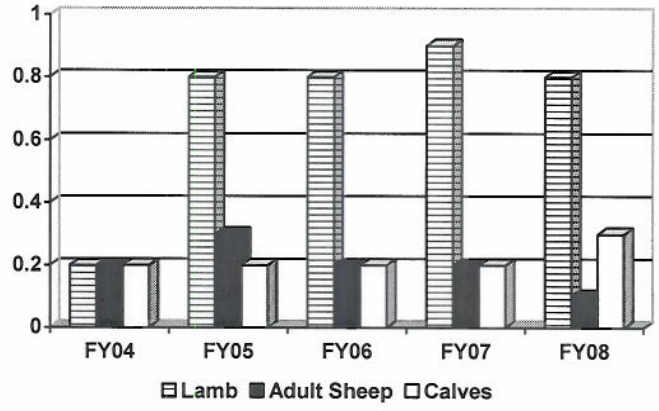
Objective A-3: *Hold adult sheep losses due to predation to less than 2% per year for producers who have signed WS agreements.*

During FY04 – FY08, the total sheep inventory in North Dakota varied from 67,000 (NASS 2009) to 81,000 (NASS 2005). Documented predation on adult sheep protected by WS between FY04 and FY08 never surpassed 0.3% (Figure 1).

Objective A-4: *Hold calf loss due to predation to less than 1% per year for producers who have signed WS agreements.*

The statewide calf crop for North Dakota ranged from 960,000 (NASS 2005 and NASS 2007) to 920,000 (NASS 2009). Documented predation on calves protected by WS between FY04 and FY08 never surpassed 0.3% (Figure 1).

Figure 1. Annual Loss (%) of Lambs, Adult Sheep, and Calves; FY04 – FY08.



Objective A-5: *Provide requesting cooperators and cooperating Federal State, Tribal, and local agencies with information on non-lethal management techniques proven to be effective for reducing predation.*

Discussions of non-lethal management strategies were held with livestock producers during annual meetings with the North Dakota Stockmen's Association and the North Dakota Lamb and Wool Producers Association. During the 5-year reporting period, WS conducted 1,327 PDM technical assistance projects (Table 1). All cooperators and cooperating agencies were provided information detailing lethal and non-lethal methods used for the protection of livestock from predators.

Objective A-6: *Maintain the lethal take of non-target animals by North Dakota WS personnel during damage management to less than 3% of the total animals taken.*

During the 5-year reporting period 12,549 target and non-target animals were killed during PDM activities (Table 3 and Table 4). Non-target animal take was 1%, which was below the threshold established in the 1997 EA.

Table 3. North Dakota WS Lethal Take of Target Species (MIS 2004 – 2008).

Species	FY2004	FY2005	FY2006	FY2007	FY2008	5 Yr Total
Coyote	2,334	2,352	2,502	1,899	2,231	11,318
Red Fox	92	103	62	52	59	368
Badger	18	8	28	14	9	77
Raccoon	208	71	74	50	25	428
Skunk	89	53	28	23	19	212
Mink	1	1	-	-	-	2
Total	2,742	2,588	2,694	2,038	2,343	12,405

Objective A-7: *Continue to monitor the implementation of livestock producer non-lethal techniques.* Nationwide, farmers and ranchers spent $199 million on non-lethal control methods to prevent predation, with fencing being most popular, followed by night penning and lamb sheds (NASS 2006). North Dakota WS files (unpubl. data) show that 100% of North Dakota sheep and lamb producers, where WS conducts activities, practice at least one non-lethal measure and 91% of the sheep and lamb producers use three or more non-lethal methods. During FY99, NASS (1999) reported that 82.5% of WS cooperating sheep and lamb producers in North Dakota practiced at least one non-lethal measure with expenditures of $124,040 to implement non-lethal methods. Producer implementing proactive, non-lethal methods increase the validity for taking further, possibly lethal, action to alleviate damage from predators when predation losses continue to occur.

Table 4. WS Lethal Take of Non-Target Species (MIS 2004-2008).

Species	FY04	FY05	FY06	FY07	FY08	5 Yr Total
Porcupine	-	-	1	3	-	4
Raccoon	8	1	3	7	4	23
Badger	2	4	5	2	5	18
Red fox	9	1	9	7	31	57
Striped skunk	1	4	4	1	3	13
White-tailed Deer	-	-	1	-	1	2
Gray wolf	-	1	1	-	-	2
Jackrabbit	-	-	1	2	6	9
Feral dog	1	-	4	2	2	9
Feral cat	-	1	-	1	-	2
Common Raven	2	-	1	-	1	4
Bald Eagle	-	1	-	-	-	1
Total	23	13	30	25	53	144

Objective B-1: *Respond to requests from North Dakota Game & Fish, U.S. Fish & Wildlife Service and Tribes for protection of designated wildlife, dependent on funding and workforce.*

All requests during the 5-year reporting period were addressed.

Objective B-2: *Involve the NDGF, USFWS or Tribes in wildlife damage management planning to consider specific wildlife to be protected and public health and safety when designating a wildlife damage management program.*

The current North Dakota WS program involves the NDGF, USFWS, USDA Forest Service (Forest Service), Bureau of Land Management (BLM) and Tribes, as appropriate, in the design of WS wildlife damage management programs and the implementation of minimization measures to preclude adverse impacts to target and non-target species and humans.

Objective C-1: *Respond to cooperator requests for public health and safety protection from predators using the ADC Decision Model (Slate et al. 1992).*

WS, the North Dakota Department of Health, and the North Dakota Department of Agriculture (NDDA) continued their cooperative efforts in response to reports of human health and safety/wildlife conflicts throughout the state. During the 5-year reporting period, WS responded to 235 incidents of public health and safety concerns from various species.

ISSUES ANALYZED IN DETAIL IN THE EA

Concern for the North Dakota ADC kill of predators to cause predator population declines, when added to other mortality.

A primary issue analyzed in the 1997 EA was the impact of WS predator removal on the viability of target and non-target wildlife populations. Coyote predation continues to be the prominent predator problem in the State, and more coyotes were removed than any other species (Table 3). A NDGF coyote population model determined that about 54% of the North Dakota coyote population could be removed annually and still maintain viable and healthy populations (NDGF unpubl data). Allowable annual harvests of red fox have been estimated to be 50%-70% of the total population (Pils et al. 1981, USDA 1997). Allowable annual harvest levels for raccoons were established at 49% of the total population

(USDA 1997), similar to the findings of

Clark et al. (1989). In western Illinois, Sanderson (1987) estimated that 49-59% of the total raccoon population could be harvested without decreasing the population. Badger populations can sustain an annual harvest rate of 30-40% (Boddicker 1980).

The NDGF is the state agency responsible for managing and protecting furbearer populations within North Dakota (North Dakota Administrative Code, Title 30, Article 30-01, Chapter 30-01-01). Regulations established by the NDGF are designed to provide harvest opportunities and to reduce conflicts between wildlife and humans, while ensuring sustainable populations. Trend information on the statewide population status of coyotes, red fox, raccoons, badgers, and skunks taken by regulated harvest and by WS activities indicate that those populations are stable or increasing throughout North Dakota, with minor fluctuations from year-to-year (D Fecske, NDGF Furbearer Biologist, pers. comm. 2009). Thus, WS activities are having no adverse effect on predator populations in North Dakota. Further, WS only conducts PDM on a relatively small portion of the total land area of North Dakota; ranging from 3% to 5% during this reporting period. Therefore, WS' activities could only affect a relatively small portion of the statewide furbearer population.

Concern for the North Dakota WS kill of non-target wildlife and T&E species incidental to North Dakota WS predator damage management.

WS Policy (WS Directive 2.450) states, "Non-target animals captured would be released if it is determined that they are physically able to survive." From FY04 through FY08, North Dakota WS' non-target kill totaled 144 animals (Table 4). No non-target animals were taken by aerial gunning, calling, shooting, denning, or through the use of dogs.

On January 6, 2004, WS requested initiation of formal Section 7 consultation concerning the possible effects of WS PDM activities on the threatened and endangered species (T&E) found within North Dakota. The USFWS issued a Biological Opinion (BO) in May, 2004 and it detailed reasonable and prudent measures WS should take to minimize the incidental take of T&E species, including bald eagles and gray wolves. Incidental take statements were also developed for both the bald eagle and gray wolf.

No T&E species were impacted by WS activities in FY04, FY07, and FY08. However, in FY05 a gray wolf [7] was accidental killed in a neck snare which had been set to capture coyotes at a site which had a history of coyote predation to sheep. The USFWS investigated the incident and determined that WS had complied with the reasonable and prudent measures identified in the 2004 BO and the take of one gray wolf in FY05 was less than the anticipated take established in the incidental take statement of the 2004 BO.

In FY05 a bald eagle [8] was accidentally killed when it activated an M-44 device which had been set to reduce coyote depredation to sheep. The take of the bald eagle in FY05 was less than the anticipated take established in the incidental take statement of the 2004 BO. However, in 2006 WS and the USFWS mutually agreed to amend the reasonable and prudent measures (to minimize accidental take of bald eagles) identified in the 2004 BO. The amendments established more restrictive reasonable and prudent measures than those detailed in the 2004 BO.

In FY06 a gray wolf was accidental killed after activating an M-44 device which had been set to capture coyotes at a site which had a history of coyote predation to sheep. The USFWS investigated the incident and determined that WS had complied with the reasonable and prudent measures identified in the 2004 BO and the take of one gray wolf in FY06 was less than the anticipated take established in the incidental take statement of the 2004 BO.

Concerns for the potential use of each predator damage management method.

All methods are used and would continue to be used as selectively and humanely as possible, in conformance with the WS Decision Model (Slate et al. 1992) and WS Program Directives. North Dakota

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[7] Gray wolves found in the eastern ⅔ of North Dakota have been delisted from the ESA (Federal Register 74(62): 15069-15123) and are managed by NDGF as furbearers with a closed season.

[8] Bald eagles were delisted from the ESA in 2007(Federal Register 72(130): 37345-37372).

WS personnel were trained in the use of each method and certified as pesticide applicators by the NDDA through the North Dakota State University Extension Service's pesticide training and certification program. Some methods may be more or less effective or applicable depending on weather conditions, time of year, biological considerations, economic considerations, legal and administrative restrictions, or other factors. Because these factors may at times preclude use of certain methods, it is important to maintain the widest possible selection of damage management tools to most effectively resolve predator damage problems.

Concerns over the selectivity, relative cost, and effectiveness of each predator damage management method.

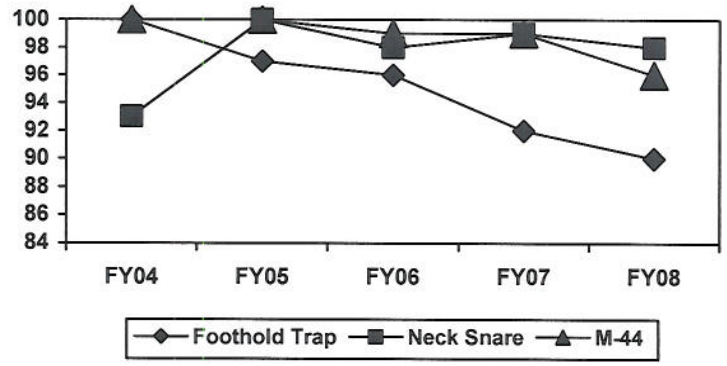
Chapter 4 of the 1997 EA included discussion about the relative effectiveness and selectivity of the various methods used by North Dakota WS and that discussion will not be repeated here. Under the current program, all methods are used as selectively and effectively as possible, in conformance with the WS Decision Model (Slate et al. 1992) and WS Program Directives. The selectivity of each method is based, in part, on the application of the method and the skill of the personnel, and the direction provided by WS Directives. Effectiveness of the various methods varies widely depending on local circumstances at the time of application.

Several of the methods employed under the current program are typically 100% selective for target species. These methods include aerial gunning, shooting, and denning. Other methods, such as foot-hold traps, neck snares, and the M-44 device are slightly less selective.

North Dakota WS uses foot-hold traps with offset jaws and pan-tension devices to reduce injuries to captured animals and to improve selectivity (WS Directive 2.450). The selectivity of snares is largely a function of how and where they are set. Breakaway snare locks are used to allow the release of larger animals such as deer or livestock which may be caught accidentally. In addition, North Dakota WS personnel often try to reduce the need for setting traps or snares by first trying to remove problem animals by shooting or aerial gunning.

Selectivity of capture devices is defined as the total number of target species (captured/taken by a capture device) divided by the total of target and non-target species captured/taken by the devices. During the 5-year reporting period, the selectivity of foothold traps ranged from 90% to 100% (Figure 2). The selectivity of neck snares during the same time frame ranged from 93% to 100% and the selectivity of the M-44 device ranged from 96% to 100% (Figure 2).

Figure 2. Selectivity (%) of foothold traps, neck snares, and M-44; FY04 - FY08.



Other damage management methods include decoy or trapline dogs which can be highly selective for removing target animals. Decoy and trapline dogs are relatively inexpensive to use in North Dakota, and they can be utilized in conjunction with aerial gunning, for finding dens, and for trailing target animals.

Denning is very selective because positive identification of the species is possible. Denning, and the act of finding the den, can be time consuming and therefore relatively more expensive compared to other methods. Aerial gunning, shooting, denning, and use of dogs are extremely selective methods; no non-target animals were taken by these methods during the 5-year reporting period.

Use of livestock guarding dogs by sheep producers has proven effective in preventing or reducing some predation losses (Green and Woodruff 1996), and use of guard dogs is generally perceived as a selective

form of non-lethal damage management. But use of guard dogs may also involve deaths of target and non-target animals. Timm and Schmidt (1989) documented that guard dogs in their study regularly killed deer fawns. Llamas have also been advocated as effective livestock guarding animals (Franklin and Powell 1994), but some degree of hazard to livestock may exist from the use of llamas for this purpose. Llamas are sometimes carriers of paratuberculosis (Johne's disease) which may be transmissible to native ungulates or domestic livestock (Wildlife Management Institute 1995). This disease involves a chronic wasting of the intestinal tract and associated lymphoid tissues, and there is no known cure.

Concerns about Aerial Gunning

WS PDM activities, including aerial gunning, are only conducted on those areas where the landowner or lessee has signed an "Agreement for Control" or where work plans have been discussed with appropriate state and federal land management agencies. During FY04 to FY08, WS' aerial operations were conducted on 0.7% to 2% of the total North Dakota land base. Those aerial operations activities did not result in any fuel spills or fires and there were no reports of threats to public health or safety.

Concerns over the effects of North Dakota WS Predator Damage Management on Public Health and Safety.

Effects on public health and safety include potential benefits caused by North Dakota WS fostering a safer environment and the potential negative effects that might result from the exposure of the public to PDM methods. The two chemical methods used in PDM (sodium cyanide in the M-44 and sodium nitrate in the gas cartridge) pose possible risks, but the risks associated with these methods are mitigated through specific direction provided by WS Program Directives.

Concerns over the Economic Effects of Predator Damage Management.

Economic impacts are monetary benefits or liabilities that the current program would have on livestock and wildlife losses, public health and safety, and property. A review of the WS Program's Economic Impact Assessment may be found in USDA (1997:Chapter 4), which is incorporated by reference.

An economic analysis of WS activities as conducted back in the decades of widespread toxicant use would likely show a much higher benefit per unit cost than PDM programs as currently practiced. Although toxicants were cheap and very effective at keeping predator numbers and predator losses low, there were valid concerns about some of the environmental impacts of their use. Our social value system has essentially established limits on how cost-effectively wildlife damage management can be conducted. As restrictions on use of damage management methods increase, cost-effectiveness of damage management is reduced.

Benefits of the current program in North Dakota can be shown by examining predation rates to lambs, sheep, and calves (Figure 1). Those losses are well below stated objectives of the damage abatement program (see Objectives A-2 through A-4). However, other measures of economic efficacy are the level of predation prevented by WS PDM program and the cost:benefit ratios of the program.

Bodenchuck et al. (2002) summarized the impacts of predator-induced losses in the absence of damage abatement programs: average annual losses of lambs equal 18%, adult sheep average 6% loss annually, and calve losses average 3% annually. Applying these values to the number of animals protected by WS' PDM program provides an estimate of the potential loss of lambs, adult sheep, and calves to predation. Comparisons between potential loss and actual loss of these classes of livestock provide insight into the amount of predation prevented as a result of WS' activities. Applying market values to the numbers of animals saved helps measure the economic benefits of the WS' program.

The North Dakota WS PDM program potentially prevented predator impacts to livestock on those properties where damage management action was taken during the 5-year reporting period. The savings not only benefited those livestock producers, but other segments of society as well. Recognizing the economic benefits of predation management extend beyond properties where WS provides assistance, Bodenchuck et al. (2002) applied a 3X multiplier effect to the direct savings which resulted from the prevention of livestock losses from predators. Using that same multiplier raises the economic benefits of

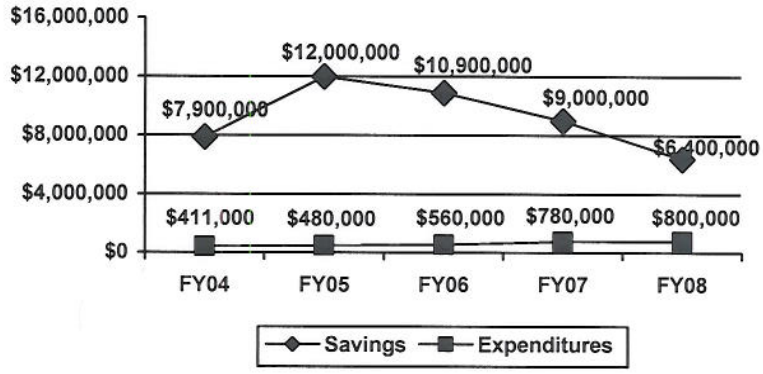
the WS PDM program to segments of society not directly involved with livestock production in North Dakota. The gross total benefit (sum of direct and indirect benefits) of PDM in North Dakota varied from $6.4 million to $12 million during FY04 through FY 08 (Figure 3).

The North Dakota WS program is cooperatively funded through a combination of federal and non-federal funding. Total funds during the 5-year reporting period ranged from $411,000 in FY04 to $800,000 in FY08 (Figure 3). The cost:benefit ratios of WS predator damage management program (defined as the ratio between one dollar of funds expended, to the amount of monetary losses saved) varied from 1:8 to 1:15 during the FY04 - FY08 reporting period [9] (Figure 3).

Coordination with Federal and State Agencies

Work plans were established with and wildlife damage management methods were used consistent with BLM and Forest Service land use plans when and where it was determined necessary by WS personnel to resolve or prevent problems. M-44s and gas cartridges were used according to the label and use-restrictions, and M-44s were removed during bird hunting seasons.

Figure 3. Total potential savings versus total cost of predator damage management in North Dakota.



SUMMARY

Based on a review of information available since the completion of the 1997 EA, subsequent monitoring reports, and the 2003 supplement, the North Dakota WS PDM is not having adverse impacts on wildlife populations or the quality of the human environment. The analysis in the original EA, subsequent monitoring reports, and the 2003 supplement failed to identify any cumulative impacts nor are there any significant impacts to the quality of the human environment from the current PDM program conducted by North Dakota WS. The area (acres) that North Dakota WS conducts its work activities continues to be a low proportion (less than 5%) of the total land area of North Dakota. The effects to predator and non-target populations that North Dakota WS targets during PDM are low and do not have long-term adverse impact on any species, nor are there any adverse affects to human health and safety from WS actions.

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6/12/09
Date

[9] Cost:Benefit Ratio: FY04 (1:19); FY05 (1:25); FY06 (1:19); FY07 (1:12); FY08 (1:8).

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